SECTION 12 CONTENTS

WATER QUALITY

Water quality is very important and often fragile. While natural environmental processes provide a means for removing pollutants from water, there are definite limits. It is up to society to provide safeguards to protect and maintain water quality.

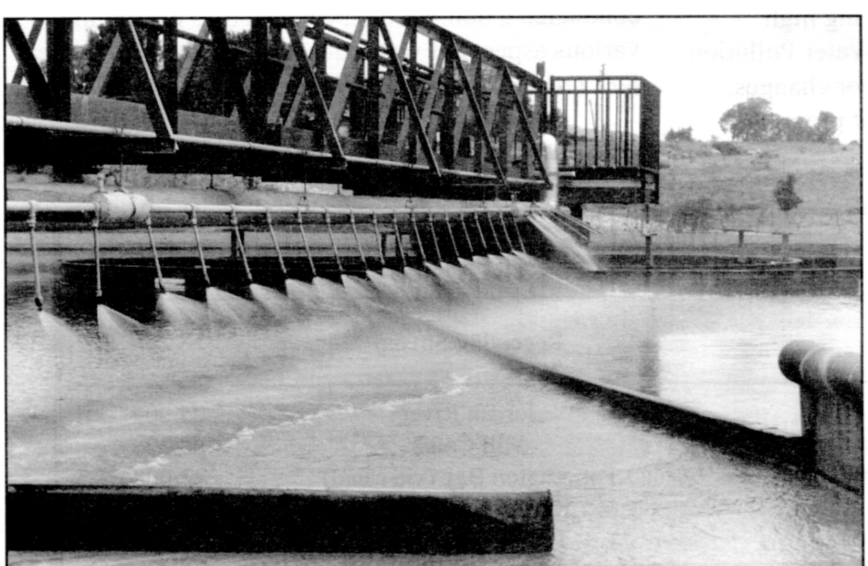
12.1 Introduction

This section presents data and information on existing levels of water quality in the Jordan River Basin. Sources of pollution are identified, problems and solutions are discussed, and recommendations for control and improvement by responsible agencies are given. Water pollution comes from natural and man-caused sources. Examples of naturally occurring pollution include such things as mineral springs, erosion, land-slides, wildlife waste materials, and dead and decaying animals. Man-caused pollution is categorized as being from either point or non-point sources. Point sources contribute pollution from a single definable point such as a pipe discharge from an industrial plant or municipal wastewater treatment facility. Non-point pollution comes from diffuse sources via overland flow and gully erosion. These include pollution from activities such as agricultural-related operations, rangeland uses, mining, urban runoff, construction, recreation and hydrologic modifications.

12.2 Setting

The 44-mile stretch of the Jordan River from the outlet of Utah Lake to the Great Salt Lake is currently used for recreational, industrial, agricultural and wildlife purposes. The Jordan River represents a tremendous potential for even greater usage in all of these areas, as well as a potential source for domestic water if the water quality could be improved to acceptable standards.

Significant water quality changes take place as the Jordan River flows through the urbanized Salt Lake County area. The characteristics of the impacts on the Jordan River change from agricultural to urban/ industrial as the river flows this course, and the impacts on the physical parameters are significant.



South Valley Water Reclamation Facility, West Jordan

As pointed out in the *Utah State Water Plan*, the Jordan River has been identified by the Division of Water Quality as one of the state's highest priorities for water pollution control efforts and activities. It is generally acknowledged that water flowing from Utah Lake is of poor quality. The water quality issues for Utah Lake and its tributaries will be addressed in the *Utah Lake Basin Plan.* Water quality data collected for the Jordan River, however, shows water quality continues to be degraded as the river makes its way through Salt Lake Valley enroute to the Great Salt Lake. The

Division of Water Quality recently completed intensive water quality monitoring on the Utah Lake and Jordan River sub-basins. The monitoring was done in conjunction with the division's watershed management initiative in the basin. The results of that monitoring are presented in the *Utah Lake-Jordan River Basin Stream Assessment.*

The Division of Water Quality, in conjunction with the Jordan River Sub-basin Watershed Management Council, is in the process of conducting a watershed management approach initiative in the Jordan River Basin. The watershed approach features a high level of stakeholder involvement, water quality monitoring and information gathering, problem targeting and prioritization, and integrated solutions that make use of multiple agencies and groups. The result of the process will be the completion and implementation of a watershed management plan.

At the present time, the basin has five wastewater treatment plants(WWTP). Four are public facilities, and the fifth is privately owned and operated by Kennecott Utah Copper as a self-contained facility. South Valley WWTP discharges directly to the Jordan River while Central Valley WWTP discharges to Mill Creek just above its confluence with Jordan River. The other two treatment plants, Salt Lake City WWTP and Magna WWTP, discharge almost directly into the Great Salt Lake (See Table 12-1).

12.3 Organizations and Regulations

Passage of the Utah Water Pollution Control Act of 1953 ushered the state into maintaining high quality water resources. The Federal Water Pollution Control Act in 1972 brought about major changes, particularly in the wastewater treatment program. The Safe Drinking Water Act of 1976 requires individual watersystems to collect data on various bacteriological parameters, inorganic chemicals, and organic chemicals that may be a hazard to public health. In general, analyses are required on delivered water and not raw water sources.

A number of federal, state and local agencies are currently involved in the management and monitoring of water quality. These agencies include the Salt Lake City-County Health Department, Salt Lake County Flood Control, Utah Department of Agriculture, Department of Environmental Quality (Division of Water Quality, and Division of Drinking Water), Bureau of Reclamation, U.S. Geological Survey, and Environmental Protection Agency.

12.3.1 Local

Towns, cities and counties have primary responsibilities for water pollution control within their respective entities. These responsibilities and authorities are contained in Sections 10, 11, 17, 19 and 73 of the *Utah Code Annotated, 1953, Amended.*

Salt Lake County Division of Flood Control and Water Quality - This agency has been designated the water quality planning agency for Salt Lake County.

Although the agency does not run its own water quality monitoring program, it uses the results of the monitoring programs conducted by other agencies to develop the water quality management plans for the county. In addition, this agency has sponsored or conducted a number of special studies examining various aspects of water quality. These include the *Salt Lake County Clean Water Act, Section 208 Study*

Table 12-1
MUNICIPAL AND INDUSTRIAL WASTEWATER TREATMENT FACILITIES

Treatment Facility	Receiving Stream	Discharge[a] (acre-feet/year)
South Valley Wastewater Treatment Plant	Jordan River	25,000
Central Valley Wastewater Treatment Plant	Mill Creek	68,000
Salt Lake City Wastewater Treatment Plant	Farmington Bay (via canal)	41,000
Magna Wastewater Treatment Plant	Kersey Creek/GSL	2,400
Kennecott Utah Copper Tailings Pond	Total Containment	17,000

a) From discharge records for 11/1/94-10/31/95 in conjunction with Hydroscience, Inc., an *Urban Runoff Study* with the EPA and USGS, and the *Jordan River Water Quality Study* with the USGS.

12.3.2 State

The state agency charged with the responsibility to regulate water quality issues is the Department of Environmental Quality/Division of Water Quality. Historically, water quality and water quantity have been under separate jurisdictions. Changing conditions will impact this relationship. Increasing populations will require more high quality water to meet their needs. More water quality problems will also be associated with increased urban growth and recreational activities. These conditions will require those concerned with water quality to work more closely with administrators of water rights. Eventually, close coordination will be required as one issue will directly influence the other.

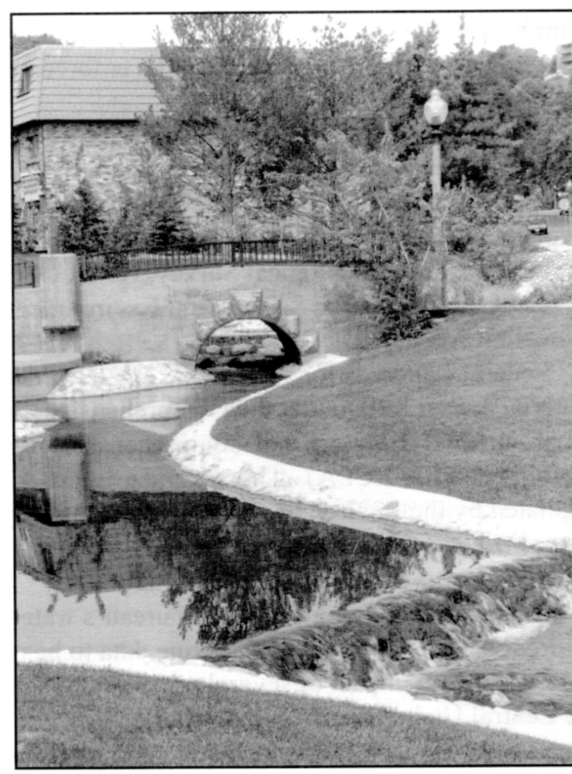
State programs are not comprehensive enough to cover all activities which can be sources of groundwater contamination. The many activities leading to pollution of groundwater suggest it will be difficult in the future to maintain the high quality of groundwater unless local governmental agencies take an active role in protecting wells, springs and the groundwater aquifer. This issue is discussed in more detail in Section 11, Drinking Water, and Section 19, Groundwater.

Utah Department of Agriculture - The Environmental Quality Section of the Department of Agriculture manages Utah's agricultural non-point source water pollution control and prevention program via contract from the Department of Environmental Quality (DEQ). This is partially funded through federal grants passed through DEQ from the Environmental Protection Agency (EPA) and partially supported by matching funds from state and local government agencies and private sources. The program is divided into several parts: watershed management projects, usually on-the-ground conservation efforts; groundwater monitoring, which is a combination of education and monitoring; and information and education, a combination of public information, including newsletters, brochures, videos and slide shows, and school and adult education.

Department of Environmental Quality - The Department of Environmental Quality has implemented the *Groundwater Quality Protection Strategy* for the state of Utah based on an Executive Order issued in 1984 by the governor of Utah.

Under the Utah Water Quality Act, the Division of Water Quality is responsible for establishing water quality standards and regulating impacts to the waters of the state. Additionally, the Environmental Protection Agency has delegated authority to Utah to administer its federal-based water quality regulatory programs. Facilities that produce, treat, dispose of or otherwise discharge waste water may need permits from the Division of Water Quality.

A Storm Water Discharge Permit is required for most industries and some municipalities that discharge storm water runoff to surface waters such as lakes or streams. Storm water pollution prevention plans must be in place prior to application. Any facility that discharges or may discharge pollutants to groundwater is required to obtain a Ground Water Discharge Permit. Major agricultural, municipal and industrial dischargers are regulated.



City Creek at City Creek Park

Discharging wastewater to surface waters, including storm drains, requires a permit prior to beginning operations. Utah Pollutant Discharge Elimination System (UPDES) Permits are required for all industrial, municipal and federal facilities. Facilities treating wastewater may need construction permits unless they discharge into a municipal sanitary sewer system.

The Division of Water Quality has established surface stream classifications in Utah based on existing uses. Table 12-2 gives the classification for the Jordan River Basin streams. As can be seen from the table, stream reaches can fall under more than one classification.

12.3.3 Federal

To date, the role of the federal government has been to set national policy by passing laws such as the Safe Drinking Water Act and the Clean Water Act. The federal government's present approach is to allow states considerable leeway in enforcing and complying with these statutes. However, should states and local governments fail to act decisively to comply with the laws, the federal government may move towards a more active role in the enforcement of federal water quality standards.

The federal government has also been involved in funding numerous water quality projects through the Superfund Cleanup Program. The primary agencies involved in water quality issues are the Bureau of Reclamation, U.S. Geological Survey, Natural Resources Conservation Service and Environmental Protection Agency.

Federal standards for solid waste and hazardous material are set forth under the Comprehensive Environmental Response and Comprehensive Liability Act (CERCLA). These standards are regulated by the Environmental Protection Agency. Compliance is verified through the City-County Health Department Monitoring Program.

Bureau of Reclamation - The bureau's water quality objective is to collect baseline data to be used in assessing the impact of several projects (including the Central Utah Project) on the water quality of streams. In January 1986, the bureau completed a *Jordan River and Tributary System Water Quality Data Update and Study.*

U.S. Geological Survey - The U.S. Geological Survey (USGS) has an established data base on surface and groundwater quality in the study area. Although the major emphasis of the USGS program is flow measurement, some stations are routinely monitored for water quality. Within the Jordan River Basin (below Utah Lake), surface water quality data have only been collected at station number 1017100 (Jordan River at Salt Lake City) located at 1700 South near 1000 West in Salt Lake City. The USGS data can be accessed through either the EPA STORET system or the USGS WATSTORE system.

The U.S. Geological Survey started the *Great Salt Lake National Water Quality Assessment (NAWQA) Study* in 1996. The program is funded by the federal government and includes the drainage basins of the Bear, Weber, and Jordan rivers. The long-term goals of the NAWQA program are to describe the status of and trends in the quality of a large, representative part of the nation's surface and groundwater resources. The program is intended to produce a wealth of water-quality information that will be useful to policy makers and managers at the federal, state and local levels.

Environmental Protection Agency - The Environmental Protection Agency not only has responsibility to monitor compliance with the federal Clean Water Act, but it also oversees the national Superfund Cleanup Projects. In Salt Lake Valley, Superfund Cleanup Projects are currently underway to remove Kennecott Utah Copper tailings from Bingham Creek, remove and/or contain tailings at the old Sharon Steel Mill adjacent to the Jordan River, and cleanup of the groundwater contamination plume at the Vitro Chemical Company tailing site in South Salt Lake.

12.4 Water Quality Problems and Needs

12.4.1 Surface Water

The most recently completed water quality evaluation of the Jordan River was the *Utah Lake-Jordan River Basin Stream Assessment*, by the Utah Division of Water Quality, Department of Environmental Quality, June 1996. The Division of Water Quality monitored 24 stations (Table 12-3) in the Jordan River sub-basin bi-weekly from March 1994 to June 1995. Certain pollution parameters (Table 12-4) were monitored and compared against maximum water quality standards assigned to each of the beneficial use classifications listed in Table 12-2.

If the standards are met, the water body is "fully supporting." If many, but not all, of the standards are met most of the time, the water body is "partially supporting." If the standards are frequently not met, the water body is "not supporting." The following areas of concern were identified by the study:

Table 12-2

SURFACE WATER CLASSIFICATIONS

Streams	Classification
Jordan River (Farmington to North Temple)	2B 3B 3D 4
Jordan River (North Temple to Little Cottonwood Creek)	2B 3B 4
Surplus Canal (Great Salt Lake to Jordan River)	2B 3B 3D 4
Jordan River (Little Cottonwood Creek to Narrows)	2B 3A 4
Jordan River (Narrows to Utah Lake)	1C 2B 3B 4
City Creek (Memory Park to City Creek Water Treatment Plant)	2B 3A
City Creek (City Creek Water Treatment Plant to headwaters)	1C 2B 3A
Parley's Creek and tributaries (1300 East to Mountain Dell Reservoir)	2B 3C
Parley's Creek and tributaries (Mountain Dell Reservoir to headwaters)	1C 2B 3A
Emigration Creek and tributaries (Foothill Boulevard to headwaters)	2B 3A
Red Butte Creek and tributaries (Red Butte Reservoir to headwaters)	1C 2B 3A
Mill Creek (Jordan River to Interstate 15)	2B 3C 4
Mill Creek (Interstate 15 to headwaters)	2B 3A 4
Big Cottonwood Creek (Jordan River to Big Cottonwood Treatment Plant)	2B 3A 4
Big Cottonwood Creek (Big Cottonwood Treatment Plant to headwaters)	1C 2B 3A
Deaf Smith Canyon Creek and tributaries	1C 2B 3A 4
Little Cottonwood Creek (Jordan River to Metro Water Treatment Plant)	2B 3A 4
Little Cottonwood Creek (Metro Water Treatment Plant to headwaters)	1C 2B 3A
Bells Canyon Creek	1C 2B 3A
Little Willow Creek (above the Draper Irrigation Company diversion)	1C 2B 3A
Big Willow Creek (above the Draper Irrigation Company diversion)	1C 2B 3A
South Fork of Dry Creek (above the Draper Irrigation Company diversion)	1C 2B 3A
Oquirrh Streams (Coon, Barney's, Bingham, Butterfield and Rose creeks)	2B 3D 4
Kersey Creek	6
Decker Lake	2B 3B 3D 4
Lake Mary	1C 2B 3A
Mountain Dell Reservoir	1C
Great Salt Lake	5

Class 1	Culinary raw water source
Class 1C	Domestic use with prior treatment
Class 2	Instream recreational use and aesthetics
Class 2A	Primary human contact-swimming
Class 2B	Secondary human contact-boating, wading, etc
Class 3	Instream use by aquatic wildlife
Class 3A	Habitat maintenance for cold water game fish, water-related wildlife and food chain organisms
Class 3B	Habitat maintenance for warm water game fish, water-related wildlife and food chain organisms
Class 3C	Habitat for non-game, water-related wildlife and food chain organisms.
Class 3D	Habitat for waterfowl, shore birds, water-related wildlife and food chain organisms.
Class 4	Agricultural-livestock and irrigation water.
Class 5	Great Salt Lake general use-primary and secondary human contact, water-related wildlife and mineral extraction.
Class 6	General use restricted and/or governed by environmental and health standards and limitations.

Table 12-3 **DIVISION OF WATER QUALITY SAMPLING SITES** **JORDAN RIVER SUB-BASIN INTENSIVE MONITORING**	
STORET Number	Sampling Site
499182	Jordan River at Cudahy Lane (above South Davis WWTP)
499232	Jordan River at 1100 W 2100 S
499409	Jordan River below 6400 S at I-215 crossing
499417	Jordan River at 7800 S Crossing (above South Valley WWTP)
499460	Jordan River at Bluffdale Road Crossing
499195	City Creek above Filtration Plant
499210	RBII - Red Butte Creek (above Red Butte Reservoir)
499216	Emigration Canyon Creek (at switchback)
499220	Parleys Canyon Creek at Highway 65 crossing (above Mountain Dell)
499222	Lambs Canyon Creek
499217	Mountain Dell Creek at Highway 65 crossing (below Little Dell)
499219	Little Dell Creek at Highway 65 crossing (above Little Dell)
499254	Mill Creek above Central Valley WWTP at 300 W
499264	Mill Creek at U.S. Forest Service boundary
499278	Mill Creek at Elbow Fork
499297	Big Cottonwood Creek above Jordan River at 500 W
499310	BC1 Big Cottonwood Creek at U.S. Forest Service Boundary
499323	BC9 Big Cottonwood Creek above confluence with Mill Creek
499358	Little Cottonwood Creek above Jordan River at 600 West
499366	Little Cottonwood Creek at U.S. Forest boundary
499378	Little Cottonwood Creek above confluence with Red Pine Creek lc3
499444	Butterfield Creek at mouth of canyon
499418	Bingham Creek above confluence with Jordan River
499472	Utah Lake at Narrows - below pump station

- The lower miles of the Jordan River are partially supporting for aquatic life. Problems include heavy algal blooms caused by excessive amounts of nutrients and dissolved oxygen depletions due to high BOD levels. Sources identified were urban runoff and municipal wastewater treatment plants.

- Mill Creek has been impacted by phosphorus and sediments. Some of the stream's riparian habitat has been lost and stream banks have been de-stabilized by recreational uses. Salt Lake County and the Forest Service are using the fees they collect to rehabilitate the stream banks. Picnic tables and campground areas are being moved away from the stream so that the riparian habitat can be re-established.

- The lower part of Big Cottonwood Creek, from the Forest Service boundaries to the Jordan River, have been labeled non-supporting because copper levels exceed the levels for aquatic life. The source appears to be the historic canyon mining sites.

- Little Cottonwood Creek from Jordan River to the Forest Service Boundary has fairly high levels of total dissolved solids and doesn't support its agricultural use classification. This is largely due to urban runoff.

Table 12-4
DIVISION OF WATER QUALITY SAMPLING SITES
JORDAN RIVER SUB-BASIN INTENSIVE MONITORING
PARAMETERS ANALYZED

CHEMISTRY	METALS	NUTRIENTS
Bicarbonate	Aluminum	Ammonia
Calcium	Arsenic	Dissolved Nitrate&Nitrite
Carbonate	Barium	Total Phosphorus
Carbonate Solids	Cadmium	Dissolved Total Phosphorus
Carbon Dioxide	Chromium	
Chemical Balance	Copper	
Chloride	Iron	
Hydroxide	Lead	
Magnesium	Manganese	
pH	Mercury	
Potassium	Selenium	
Sodium	Silver	
Specific Conductance	Zinc	
Sulfate		
Total Alkalinity		
Total Dissolved Solids		
Total Hardness		
Total Suspended Solids		
Turbidity		

- Little Cottonwood Creek from the Forest Service boundary to the headwaters are impacted by elevated levels of zinc. Again, historic mining areas are the probable source. Zinc levels exceed the criteria for aquatic life classification.

- Bingham Creek, which is only used during spring runoff, has been labeled partially supporting of its aquatic life classification because of metals, primarily copper and zinc. It is also non-supporting of its agricultural designation because of high levels of total dissolved solids. The sources are mining sites in the Oquirrh Mountains and irrigation return flows.

- The Jordan River from Utah Lake to 6400 South has been impacted by Total Dissolved Solids (TDS). The primary sources of the TDS are water releases from Utah Lake and urban runoff. Of the pollution parameters monitored during this study, dissolved solids was the largest contributor to water quality impairment, followed closely by metals. Running a distant third was nutrient loads, followed by sediment, habitat alteration and dissolved oxygen. It should be noted that the study did not include evaluation of coliform counts, a pollution parameter previous studies had indicated as one of the Jordan River's biggest problems. Table 12-5 shows the greatest sources of water quality impairments to the Jordan River are resource extraction (erosion), urban runoff, reservoir releases, agriculture and recreation.

The *Jordan River and Tributary System Water Quality Update and Study* was published in January 1986. This study identified coliform counts in the Jordan River in the range of 10,000 to 50,000 organisms per 100 milliliters. Many sources are responsible for the high coliform counts including farm waste, irrigation return flows, and urban runoff (storm drain discharges). High levels of coliform organisms probably represent as much of a restriction to reclamation and reuse of Jordan River water as any other water quality parameter. Because there are so many sources of these indicator organisms, it follows that a clean-up program would be extensive and costly.

The minimum observed values for dissolved oxygen are generally below state standards throughout the entire lower reach of the Jordan River. These

Table 12-5 **WATER QUALITY PROBLEM PARAMETERS AND POTENTIAL SOURCES**		
Parameter	Affected Segment	Potential Sources
Suspended Sediment	3300 - 4500 South 9000 - 14400 South	Hydrologic Modifications Bed/Bank Erosion Construction
Total Phosphorus	6400 South - 1800 North 2100 South - 1800 North	Agriculture Urban
Total Ammonia	2100 South - 1800 North	Urban/Irrigation
Total Nitrate	5400 South-1800 North	Urban/Irrigation
Total Zinc	6400 South - 3300 South	Hydrologic Modifications Urban/Mining
Total Lead	7800 - 3300 South North Temple - 1800 North	Hydrologic Modifications Mining/Urban
5-Day BOD	4500 South - 1800 North	Urban/Irrigation
Dissolved Oxygen	North Temple - 1800 North	Urban/Irrigation Hydrologic Modifications
Coliform Bacteria (Total and Fecal)	6400 South - 1800 North	Hydrologic Modifications Irrigation/Urban Agriculture

minimum levels are important because fish and other aquatic wildlife are extremely sensitive to low levels of dissolved oxygen, and their overall welfare may be more closely related to the minimum levels than to the average levels. Total dissolved solids for the Jordan River range from 800 to 1,200 milligrams per liter. The TDS levels, although relatively high and an indication that the water is unacceptable for culinary use, do not constitute a violation of water quality standards under the current use classification of Jordan River water.

Toxic Substances: - *A Reconnaissance of Toxic Substances* in the Jordan River was made during July 1980 to October 1982 as part of a larger study conducted by the U.S. Geological Survey and published in 1984. Samples for toxic substances were collected at five sites on the Jordan River, at three major tributaries, and at six storm conduits. The study showed the Jordan River, starting at about 90th South, has a diversity of toxic substances with concentrations large enough to be a problem and the concentrations of toxic substances and trace elements increases in a downstream direction. DDD, DDE, DDT, dieldrin, heptachlor, methoxychlor, PCB, and 2,4-d were detected in bottom-material samples from the Jordan River and tributaries. DDE, Silex. and 2,4-d were also detected in water samples. Only one of the 112 organic compounds, chloroform, was detected.

The toxic substance most frequently exceeding state standards was total mercury. About 75 percent of the 138 samples for total mercury exceeded the state standard of 0.05 micrograms per liter. Other toxic substances that exceeded state standards were: ammonia - 18 percent of samples taken, cadmium - nine percent, copper - nine percent, zinc - six percent, and lead - two percent. In addition to sampling river flows, this study also tested river bottom sediments for the trace elements arsenic, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, selenium, silver and zinc. With the exception of beryllium, all trace elements were detected one or more times. Copper, lead and zinc had the highest concentrations. Trace element concentrations in the bottom materials in the Jordan River increased in a downstream direction. Substantial increases first were observed at 5800 South Street, and they were sustained throughout the remainder of the downstream segment of the study area.

During the period of July 1980 through October 1982, the U.S. Geological Survey, in cooperation with the Salt Lake County Division of Flood Control and Water Quality, conducted a study of Jordan River water quality. The study focused on the following four areas: sanitary quality, toxic substances, dissolved oxygen and turbidity. The following summarizes the findings:

Sanitary Quality - Data collected from July 1980 through October 1982 showed a serious sanitary problem in the Jordan River. Concentrations of total coliform bacteria commonly exceeded 5,000 colonies per 100 milliliters and concentrations of fecal coliform bacteria commonly exceeded 2,000 colonies per 100 milliliters in downstream reaches of the river. The most conspicuous aspect of the bacteriological data was its extreme variability. Because of the variability, the sanitary quality of the Jordan River cannot be predicted at any given time. More recently acquired data indicates the sanitary conditions are unchanged with respect to fecal coliform and total coliform counts. Two wastewater treatment plants, seven major tributaries, numerous storm drains, irrigation-return flow and other sources all contribute to the dynamic system that determines the sanitary quality of the Jordan River. In general, concentrations of all three indicator bacteria increased in a downstream direction. The ratio of fecal coliform to fecal streptococci concentration indicated contamination from animal waste in 92 percent of the samples from the Jordan Narrows. Contamination from human waste was indicated in none of the samples at the Jordan Narrows and 90th South, but increased to 20 percent of the samples at 1700 South Street. But human sewage in many of the samples may be camouflaged by large concentrations of fecal streptococci bacteria.

With the exception of copper and zinc, concentrations of trace elements in bottom materials in Little Cottonwood, Big Cottonwood and Mill creeks were similar to concentration levels in the Jordan River downstream sampling sites.

At the present time, the Environmental Protection Agency, jointly with Kennecott Utah Copper and Sharon Steel, is conducting a superfund cleanup project to remove and dispose of mining tailings from the Bingham Creek channel, the Sharon Steel mine and mill site and surrounding lands in Midvale. This effort could have a significant impact on reducing the heavy metals concentrations in the Jordan River.

Dissolved Oxygen - Dissolved oxygen depletion in the Jordan River was identified as a major problem by two-thirds of the federal, state and local agencies responding to a request from the U.S. Geological Survey for comments on the study. Depletion of the dissolved oxygen concentrations to less than 5 to 6 milligrams per liter adversely affect fishery populations, benthic organisms and the natural oxidation of organic substances in the water. The intent of the study was to provide sufficient data and interpretation to understand the dissolved oxygen regime of the Jordan River. The study accomplished the following goals: 1) Historical data were tabulated and compared to current data to determine trends, 2) re-aeration rates and time-of-travel were determined for the Jordan River from 12300 South to 1800 North Streets, 3) algal productivity and its impact in the downstream part of the river (north of 5800 South Street) were calculated, and 4) loads of oxygen-demanding substances from storm runoff and wastewater treatment plants were determined.

The study concluded mean concentrations of dissolved oxygen decreased from 8.1 milligrams per liter at the Jordan Narrows to 4.7 milligrams per liter at 500 North Street during April 1981 to September 1982. Coincident with the decrease, the biochemical-oxygen demand increased from 5 to 7 milligrams per liter. About 50 percent of the dissolved oxygen concentrations and 90 percent of the five-day biochemical-oxygen demand measured downstream from 1700 South Street exceeded the state intended-use standards. An estimated 6 million pounds of oxygen-demanding substances, as measured by the five-day biochemical-oxygen demand, were discharged to the Jordan River during 1981 from point sources downstream from 9000 South Street. Wastewater treatment plants contributed 77 percent of this load, non-storm base flows contributed 22 percent, and storm flows less than 1 percent. The Surplus Canal diversion at 2100 South Street removed about 70 percent of this load, and travel time of about one day also decreased the actual effects of the load on the river.

Turbidity - Samples were collected at five sites on the Jordan River from January 1981 through August 1982 and analyzed for turbidity, suspended sediment concentration, suspended organic carbon and other properties. Correlation coefficients ranging from 0.71 to 0.83 indicated significant relationships between suspended-organic carbon and turbidity at each of the five sites during June through October.

The primary sources of turbidity in the Jordan River are clay-sized particles and organic material, which probably originate in Utah Lake, and organic material discharged from wastewater treatment plants. Control of algal growth in Utah Lake and the Jordan River during the summer and reduction in the quantity of organic material discharged from wastewater treatment plants could reduce turbidity in the Jordan River.

Current Data - The most current data for the Jordan River has been collected by the Salt Lake City-County Health Department, which monitors the river monthly. In addition, sediment samples have been collected in conjunction with CERCLA assessments of the Jordan River, as well as wetland pond monitoring in conjunction with recent Clean Water Act, Section 319, project implementation, and Section 404, permit requirements.

The City-County Health Department has employed Equal Width-Integrated sampling on the Jordan River since 1989. This method provides more accurate data and is consistent with data collected by the U.S. Geological Survey during the Nationwide Urban Runoff Assessments of 1979-82. The method samples the entire water column across the channel width, as opposed to a point water sample. The parameters sampled include temperature, dissolved oxygen, pH, conductivity, total coliform, fecal coliform, fecal strep, biochemical oxygen demand, total suspended sediment, total nitrogen, ammonia, chloride, nitrate, sulfate, total dissolved phosphorus, hardness (CACO3), arsenic, chromium, copper, lead, selenium and zinc. Table 12-4 identifies the problem parameters as identified through current data collecting efforts.

During the course of CERCLA investigations conducted in support of the Sharon Steel, Bingham Creek and Midvale Slag Superfund remediation projects, sediment was sampled the entire length of the Jordan River for lead, zinc, copper, arsenic and cadmium. Total copper, cadmium and zinc are potential problems for food chain organisms and animals (fish and waterfowl). The principal sources appear to be urban and mining related activities.

12.4.2 Groundwater Pollution

Groundwater is one of Utah's most valuable resources. In the Jordan River Basin, groundwater accounts for roughly 45 percent of the municipal and industrial water supply. Magnifying the issue of groundwater quality is the concern with how easily an aquifer can be polluted and how difficult it can be to clean up. Additionally, groundwater contamination is not readily apparent or easily detected. Groundwater issues are discussed in detail in Section 19 of this report.

12.5 Alternative Solutions

Many federal and state agencies are charged with management or regulatory roles pertaining to water and water quality issues in the Jordan River Basin. A need existed to increase communication and cooperation among these government agencies to promote efficient planning, implementation and coordination of management and regulatory activities, as well as minimizing conflicts and preventing duplicated effort. Pursuant to that end, and in compliance with the Federal Clean Water Act, the Salt Lake County Board of Commissioners has been designated and approved as the area-wide water quality planning agency for Salt Lake County. The Salt Lake County Board of Commissioners established the Jordan River Sub-Basin Watershed Management Council. See Section 6-3 for details.

12.6 Issues and Recommendations

Only surface-water quality issues are discussed here. Groundwater quality issues are discussed in Section 19. Water quality issues in the Jordan River Basin are primarily associated with the continuing trend to convert agricultural lands to urban uses. Water quality problems are compounded because urbanization tends to degrade water quality and water quality of existing agricultural water supplies is too poor for direct conversion to municipal and industrial uses. Achieving a municipal water supply, however, is not the only worthy goal associated with improving Jordan River water quality. Today's society expects development and growth to be more in harmony with the environment. An important benefit associated with improving Jordan River water quality would be improved wildlife habitat within the streams, wetlands and adjacent riparian areas. The overall improvement of surface water quality will benefit human and wildlife users as well as aesthetics. ■